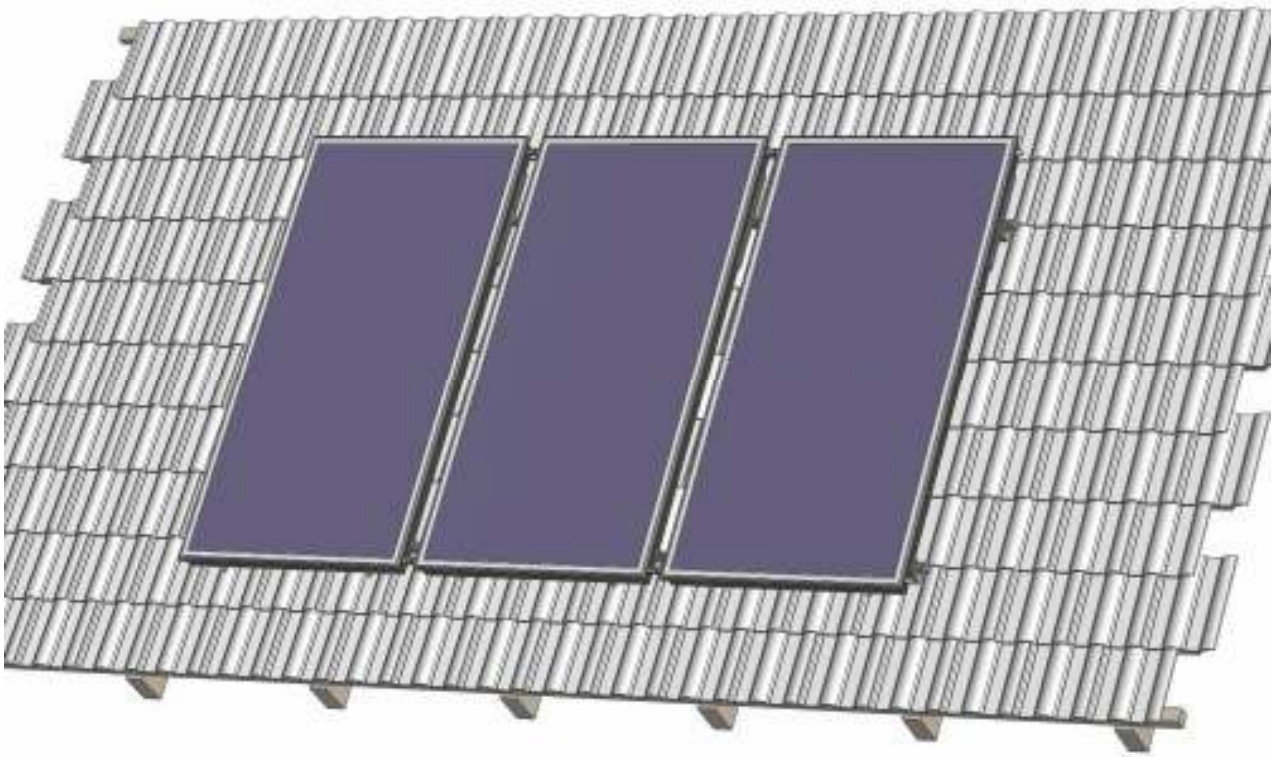
Installation & Operating Instructions for Flat Plate Solar Collectors on inclined tiled roofs:

- Harp, Copper Absorber

- Harp, Aluminium Absorber



EHC Ltd
Unit 40 Block 5
Third Road
Blantyre Industrial Estate
Blantyre
Glasgow
G72 0UP
Tel: 01698 820533 Fax: 01698 825697
Email: info@ehc-renewables.co.uk
www.ehc-renewables.co.uk

Contents:

1. General information 4

1.1. ES Solar Collector 4
1.2. Types of Solar Collectors 4
1.3. Technical data table 4
1.4. Efficiency graph 4
1.5. Domestic hot water heating installation diagram 5
1.6. Identification labels 5

2. Safety instructions 6

2.1 General 6
2.2 Working at height 6
2.3 Lightning protection 6
2.4 Installers 6
2.5 Mounting kits 6
2.6 Risk of burn injury 6
2.7 Transportation, storage and handling 6

3. Pre-Installation 7

3.1 Collector mounting kit 7
3.2 Technical documentation 8
3.3 Tools and additional equipment 8
3.4 Collector location 8
3.5 Key dimensions. 8

4. Collector Installation 9

4.1 Roof fixing 9
4.2 Mounting Rails connection 10
4.3 Mounting Rails assembly 10
4.4 Locking screws for Collector Clamp 11
4.5 Assembly of Collector Graspers 12
4.6. Assembly of Collector 13
4.7 Assembly of additional Collectors 14
4.8 Hydraulic connection 14
4.9 Inspection after assembly 15
4.10 Inlet connection 15
4.11 Outlet connection 16
4.12 Temperature sensor 16
4.13 Collecting pipes 17

5. Final Installation & Inspection 18

5.1 Check-up 18
5.2 Venting 18
5.3 Insulation 18

6. Maintenance and service 18
7. Guarantee 20

1. General information

1.1. ES Solar Collector

ES range of solar Collectors are intended to heat water for domestic properties and public utility buildings. The ES Collectors can also be used to support central heating systems and heat water for swimming pools.

1.2. Types of Solar Collectors

ES4210709 - Harp Solar Collector, copper absorber, surface area 2 m^2
ES4210808 - Harp Solar Collector, aluminium absorber, surface area 2 m^2
ES4210709 - Harp double Solar Collector, copper absorber, surface area 2 m^2
ES4210808 - Harp double Solar Collector, aluminium absorber, surface area 2 m^2

ES4211805 - Harp Solar Collector, aluminium absorber, surface area 2,3 m^2

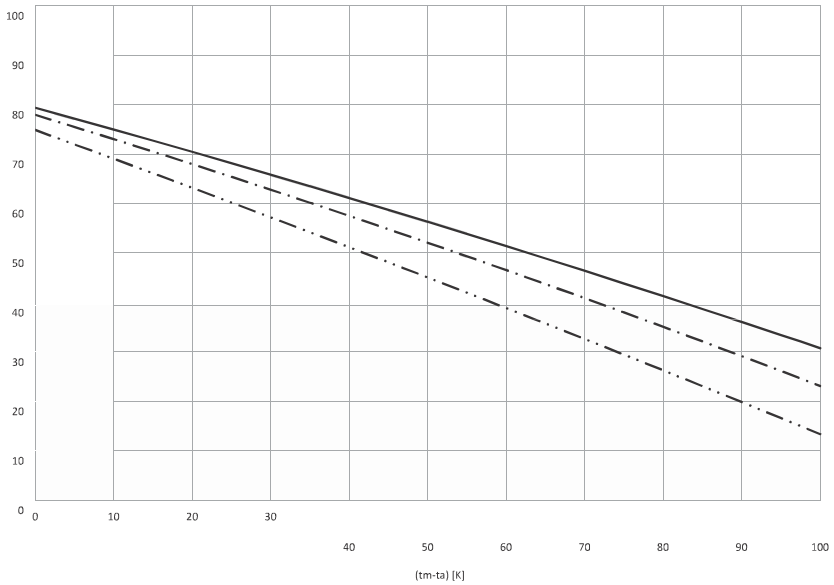
1.3. Technical data table

Flat Plate Solar Collector		**ES4210709**	**ES4210808**	**ES**	**ES4211805**
Width	mm	1072			
Height	mm	2119		2424	
Depth	mm	90			
Weight	kg	36,5		41,8	
Absorber		copper	aluminium	copper	aluminium
Collector surface area	m_2	2,27		2,6	
Absorber surface area	m_2	2,0		2,3	
Active surface area of absorber	m_2	1,98		2,28	
Optical efficiency [1]	%	81,5	80,1		77,0
Heat loss coefficient [1]	W/m_2K	3,49	3,89		4,62
Heat loss coefficient [1]	W/m_2K_2	0,004	0,005		0,003
Connections: Cu pipe	mm	18			
Liquid content	litre	1,13		1,4	
Max. working pressure	bar	6,0			
Flow: min — max.	l/min	1 - 4			

[1] Following parameters: active surface area of absorber (for G=800 W/m^2) - on base of research carried out at Institute for Fuel and Renewable Energy in Warsaw

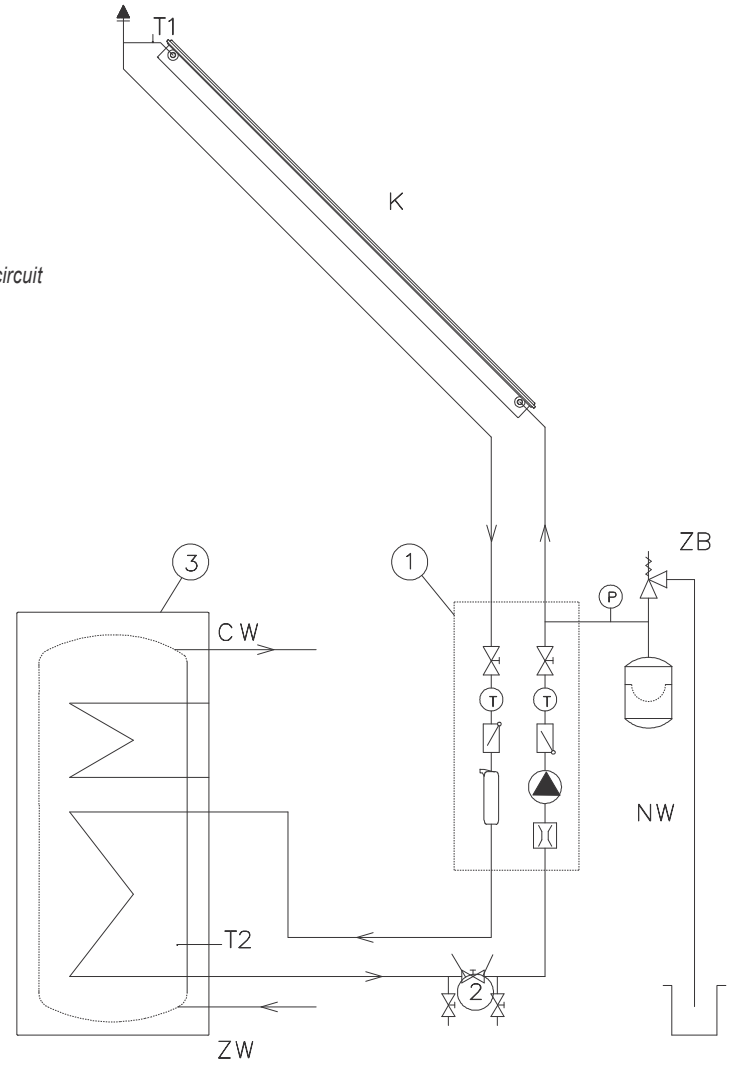
1.4. Efficiency graph

Solar Collectors efficiency graph is related to the active surface area of absorber (for G=800 W/m^2)



1.5. Domestic hot water heating installation diagram

1 - Solar pump group
2 - Valves for filling, emptying and flushing of Solar circuit
3 - Hot water tank
Ti - Collector temperature sensor
Ti - Tank temperature sensor
K - Solar Collector
NW - Expansion vessel
ZB - Safety valve
ZW - Cold water inlet
CW - Hot water outlet



Solar installation must be in compliance with the BS EN 12975/12976 norm.

1.6. Identification labels

An identification label is placed on the both sides of the Collector (at the bottom).

Additionally, the warning and information icons are placed on the left side of Collector.

User - Be aware.

The user is obligated to replace the identification labels where these are unable to be read.

2. Safety Instructions

2.1 *General*

Please carefully read and understand these instructions before installing the EHC Thermal Solar System in order to ensure: a safe, risk free installation and trouble free operation. Following installation and commissioning of the system the operation of the system and associated controls should be explained to the customer and these instructions left with them for future reference.

EHC Thermal Solar System must be installed in accordance with the manufacturer's instructions and all relevant regulations in force at the time of installation. The **EHC Thermal Solar System** is subject to Building Regulation G3 (England and Wales), Technical Standard P3 (Scotland) or Building Regulation P5 (Northern Ireland). Installation and must be carried out by a competent person.

2.2 *Working at Height*

It is mandatory that the Working at Height Regulations (WAHR) is adhered to at all times. A site Risk Assessment must be conducted before operations take place such that suitable precautions are put in place to eliminate or at the very least minimize risks of injury; not only to installers but to also protect the general public.

2.3 *Lightning Protection*

If the Solar Collector System is installed over a height of 20 M and the building is without a lightning protection system then couple the electrically conductive elements to the earth (min earth section – 16mm) and the equipotent bonding elements of the installation.

If the Solar Collection System does not exceed a height of 20 meters then a lightning protection system is not necessary. Where a building is equipped with a lightning protection system then we strongly recommend that suitably qualified and competent lightning equipment installer is used to connect the EHC Solar Installation to the existing lightning protection system.

2.4 *Installers*

It is strongly recommended that MCS Certified Installers are used in the installation or servicing of EHC Thermal Solar Systems

2.5 *Mounting Kits*

It is mandatory that only EHC Solar Collector Mounting Kits are used to support the EHC Solar Collectors and failure to carry this out may increase the risk of personal injury and/or damage to the property

2.6 *Risk of burn injury*

The solar Collectors and assembly elements may be hot due to radiation and therefore there is a risk of a burn injury. As a result the guidelines below should be followed in order to avoid burn injuries:

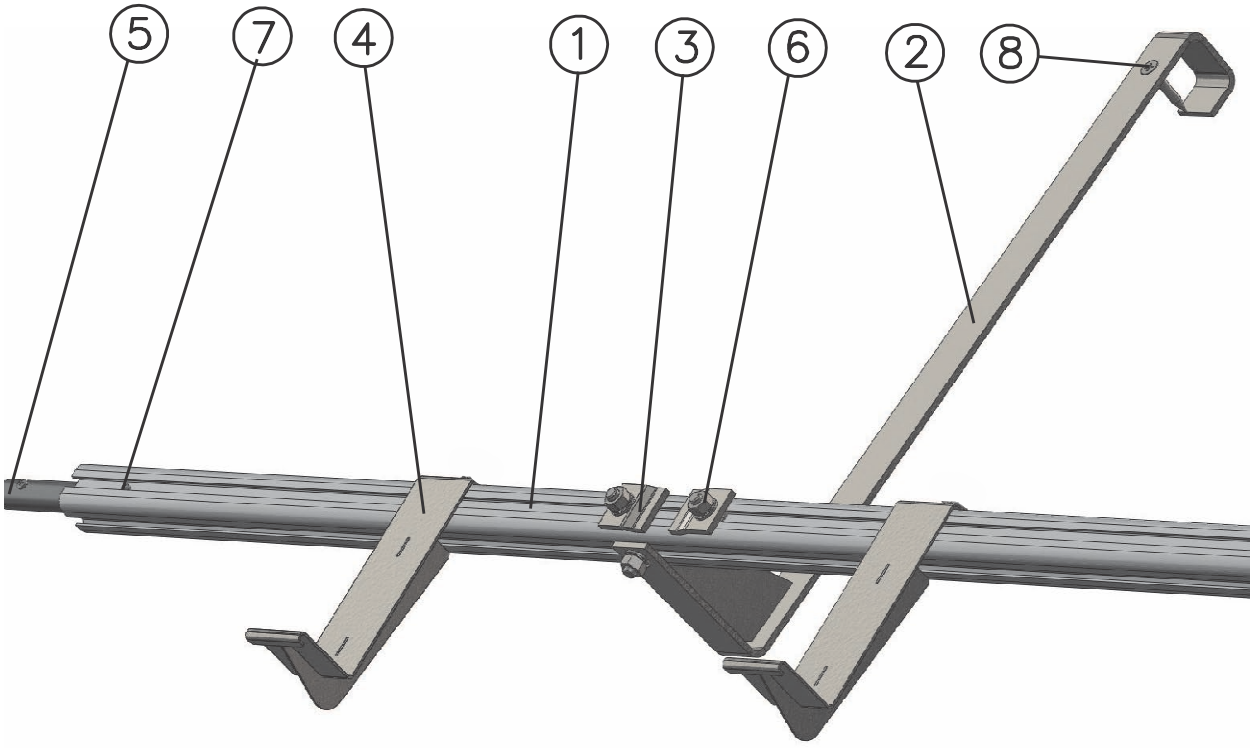
- use personal clothing (e.g. Overalls, gloves, etc)
- put a canvas cover on the Collector housing
- wait for temperature to go down before starting work on the unit

2.7. *Transportation, storage and handling*

- Transport the Collectors in original manufacturer's package & according to package marking.
- Carefully handle and do not overturn or stack unpacked Collectors
- Packed Collectors must be handled by forklifts or pallet jack
- Protect against inclement weather conditions if stored in the open air.
- Keep dry at all times
- The unpacked Collector must be carried by at least two people.
- Collector can be carried manually or by carry straps in either the horizontal or vertical position.
- Do not use tools that can scratch a Collector surface (e.g. steel cords, chains, metal hooks etc.).
- Always use lifting equipment (such a ladder hoists, pulley, swing hoists, or truck-mounted cranes/conveyors) to transport the Collector onto the roof.
- **Never touch connectors while holding/carrying/lifting solar Collectors.**

3. Pre-Installation

3.1 Collector Mounting Kit



Mounting Kit items:

Number of Collectors		1	2	3	4	5
Item	Name	Quantity				
1	Profile Rail	2	2	4	2+2	4
2	Roof fixing	4	6	8	10	12
3	Clamp	4	8	12	16	20
4	Collector Grasper	2	4	6	8	10
5	Profile connector	0	0	2	2	2
6	Locking screw (screw M8x20, nut M8, washer, ser- rated lock washer,)	8 set..	14 set..	20 set..	26 set..	32 set..
7	Self-tapping screw	0	0	4	4	4
8	Wood screw No. 6 x 40	4	6	8	10	12

Ensure the Mounting Kit is assembled correctly as above, any damaged items must be replaced by the original items only.

3.2. Technical documentation

The EHC Thermal Solar Kit contains various types of components and it is therefore important that the relevant installation instructions of these items are carefully read before installation/mounting:

- Solar Collector
- Pump group
- Solar controller
- Solar hot water cylinder

3.3. Tools & additional equipment

- Sprit level
- Safety harness for use with a safety rope
- Scaffolding, ladder or lift

3.4. Collector location

The Solar Collector surface must be in perpendicular position to the sun's rays to obtain the most efficient radiation absorption and there fore must be installed on the south side of inclined roofs

Recommended Collector position.

- Angle to sun
  40º – 45⁰ (all year round)
  30º approx. (summer time)
  60º approx. (winter time)

- **Maximum snow and wind load capacity – 2,0 kN/m².**
- **Do not install solar Collectors if the slope value is less then 15° and more then 75º**
- **There should be no shading from trees, chimneys and neighbouring tall buildings.**
- **For Collectors in a row the row-to-row solar panel shading has to be considered.**

Note: The information and drafts in this instruction refer to the vertical Collector assembly only.

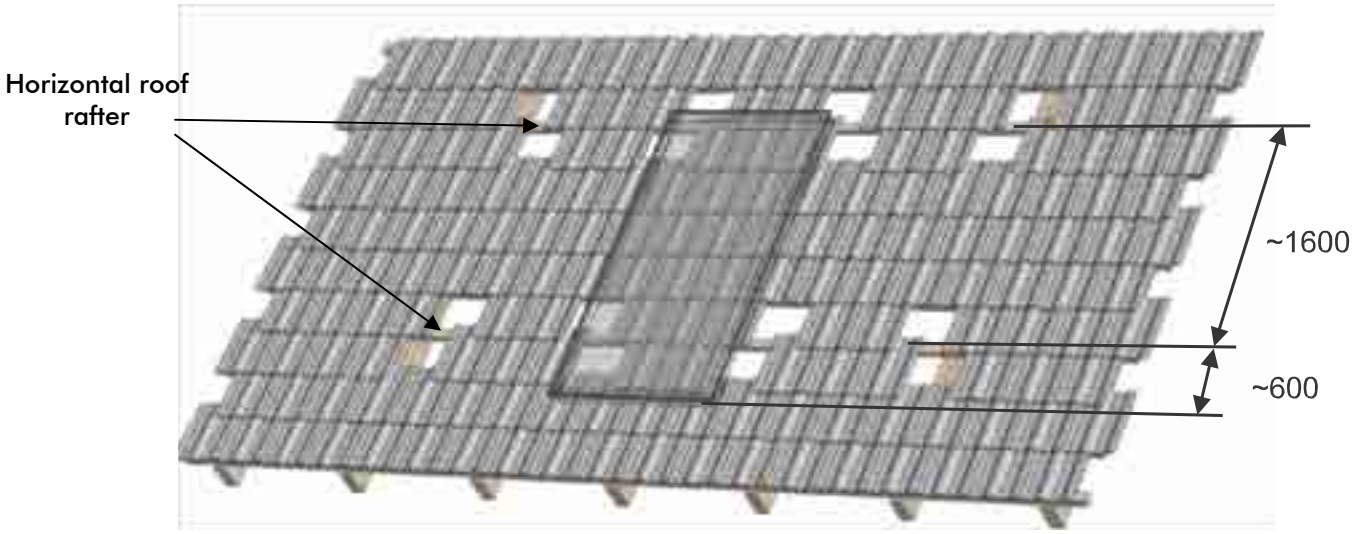
3.5. Key dimensions.

Quantity of Collectors (per set)	**1**	**2**	**3**	**4**	**5**
Dimension	Dimensions values [mm]				
A	1100	2200	3300	4450	5600
B	225		220		

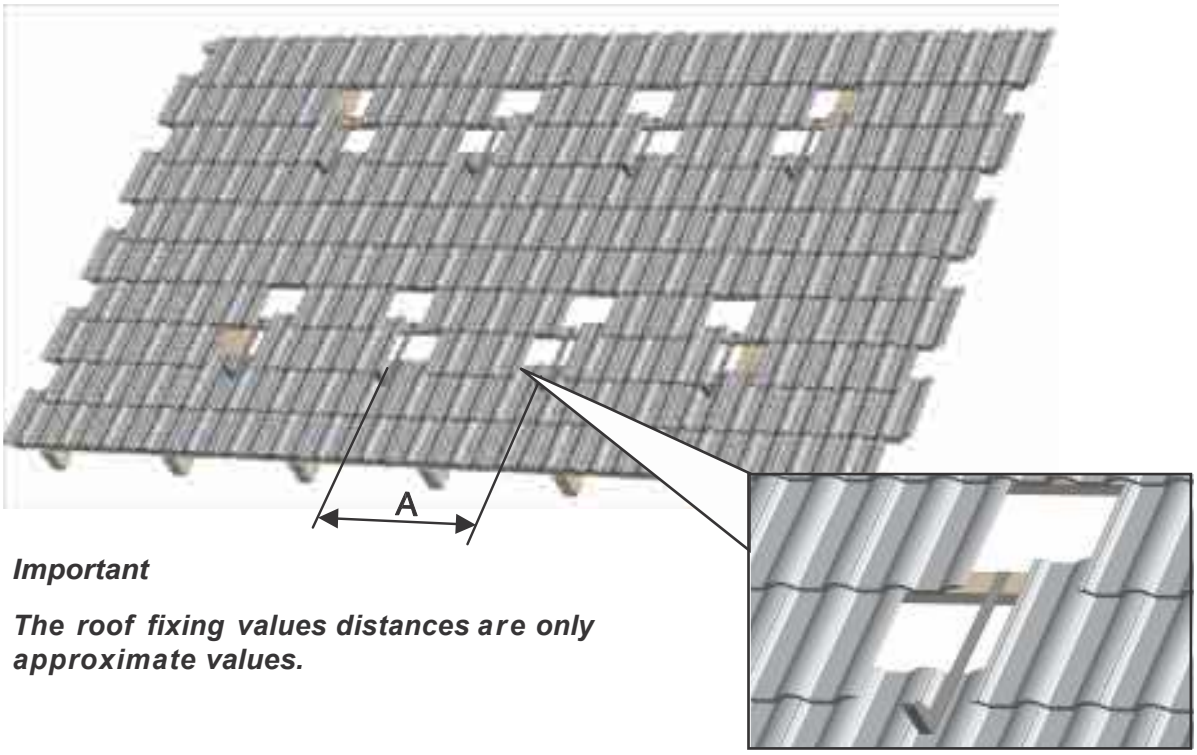
4. Collector Installation.

4.1. Roof fixing

Having decided on the location for the Collector, locate the internal horizontal roof rafters. Bear in mind that lower roof rafter must be located approx. 600 mm above bottom edge of the Collector mounting position, whereas the upper roof rafter must be located approx. 1600 mm ± 200 above it. Remove some roofing tiles to get access to the roof rafters.



Fix to the roof by using *No* 6 x 40 wood screws and maintain the "A" value distance between roof fixing points.

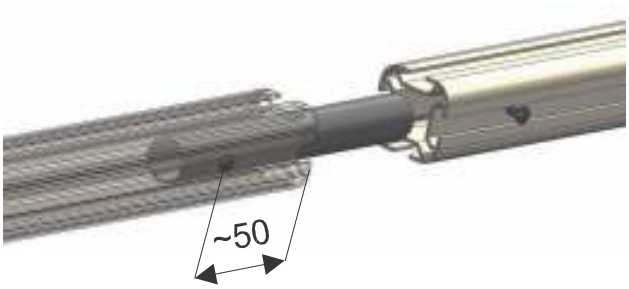


Important

The roof fixing values distances are only approximate values.

4.2. Mounting Rails connection

For three or more Collector sets the mounting Profiles must be connected. Put the half-length of Profile Rail connector (5) into the one of the ends of the Profile Rail (1), and then secure it by fixing the self-tapping screw (7) – approx. 50 mm from Profile Rail edge (1).



Put the next Profile Rail (1) into the second end of the connector (5), and then secure it by fixing the self-tapping screw (7). Make sure that the Profile Rail edges (1) are placed parallel to each other. Repeat for all Profile Rail sets.

Important.

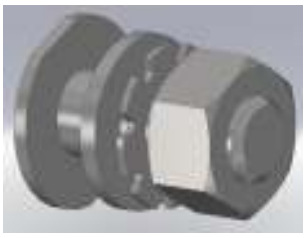
If installing 4 Collectors, make sure that two fixed sets of Rails have the same length

4.3. Mounting Rails assembly

Fix Profile Rail (1) into the double threaded bolts (2) using a locking screw (6).

Fix the locking screws (6) into the Profile Rail (1) with as many screws as doubled threaded bolts (2), Spacing between the locking screws (7) must be the same as for the doubled threaded bolts (2).

Fix the locking screws (6) into the double threaded bolts (2), and then lock the nut lightly.

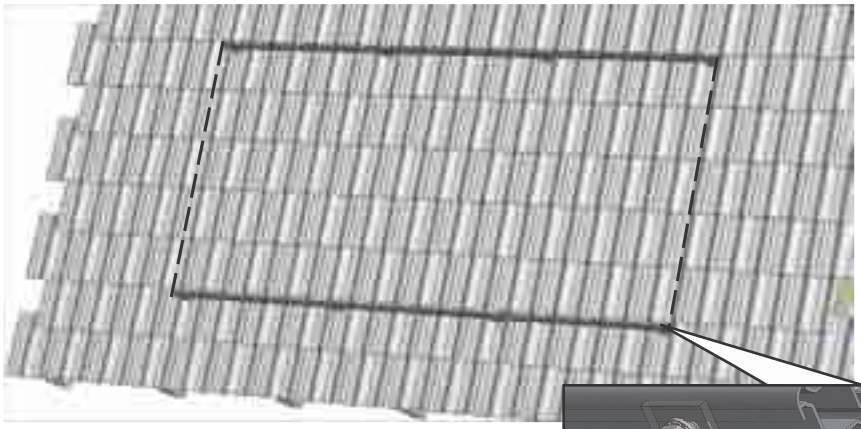


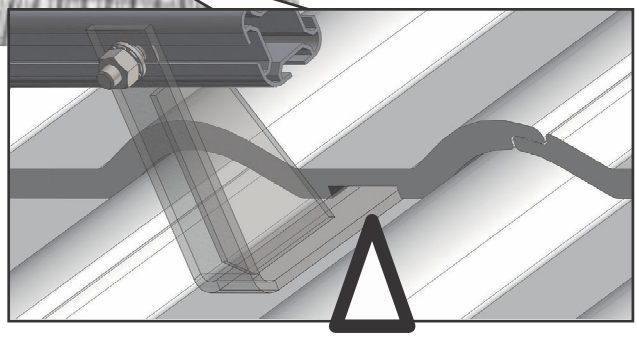
locking screw (6)

Important.

Elements of locking screw kit: 1) screw M8 x 20,2) washer,3) serrated lock washer,4) M8 nut
(Strictly follow above sequence when locking).

Repeat for next row of roof fixing (2), then level the Profile Rail edges (top and bottom) and tighten up all locking screws (6).



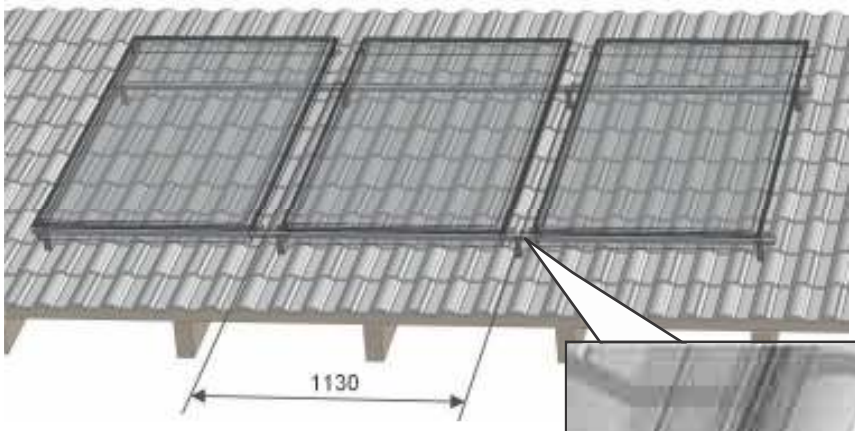


Important.

Depending on the type of tiles, some tile material may need to be removed in order to put the tiles back into position

4.4. Locking screws for Collector Clamp

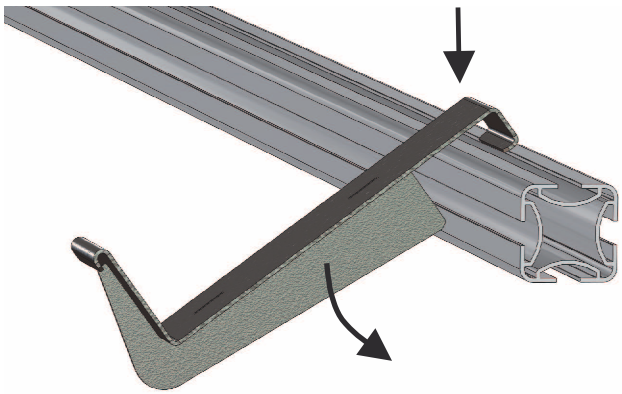
Put the locking screws (6) into the Profile Rail (top and bottom) to fix the Collector Clamp (3). Put the locking screws into the Profile Rail (1) as shown on the picture.



There are two Clamps (3) between Collectors so two locking screws (6) must be fixed and only one Clamp (3) on the edge set.

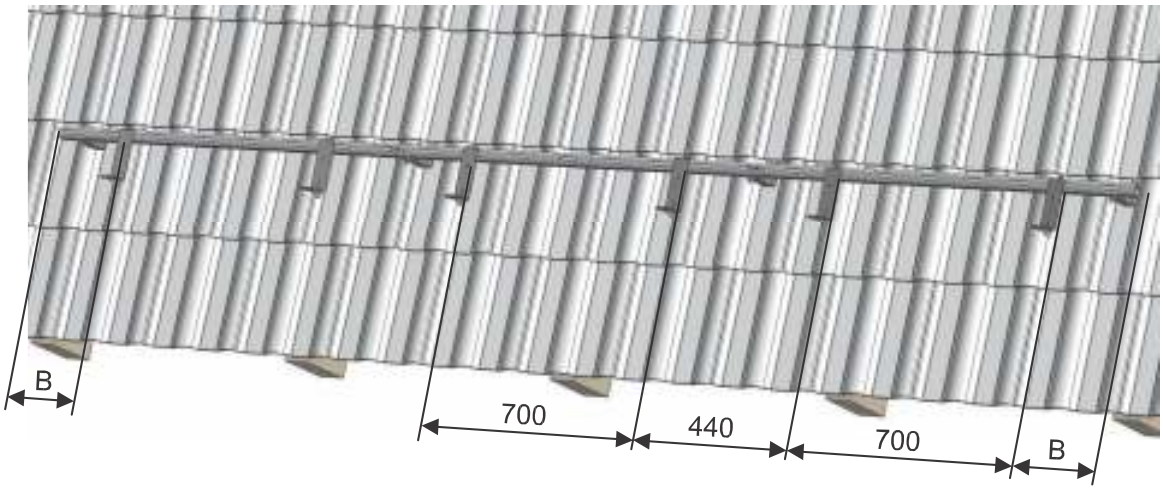
At this stage, you can put aside the locking screws (6) for Collector edges to fix them after you place the Collectors. The screws for Clamp (3) between Collectors have to be located symmetrically toward the Profile Rail centre. (Space requirements: approx. 1130 mm).

4.5. Assembly of Collector Graspers



Fix Collector Graspers (4) onto bottom Profile Rail (1). Hook the Collector Grasper onto bottom Profile Rail (1) and push downward to the final position.

Locate the first Grasper (4) at “B” distance away from Profile edge. For the other graspers keep the distance of 700mm and 440mm (alternate).



Important.

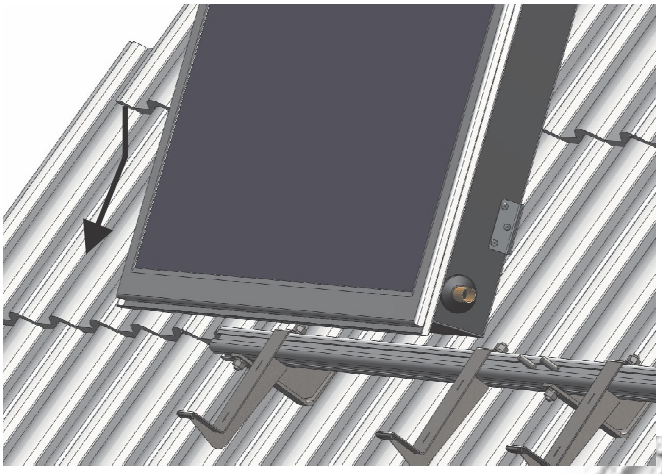
The distance between Collector Graspers is maintained correctly when the last Grasper is at “B” distance away from opposite edge of Profile Rail.

4.6. Assembly of Collector

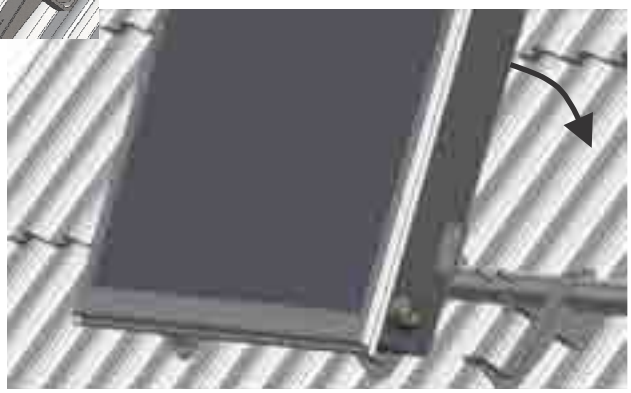
Check all connections before first Collector installation.

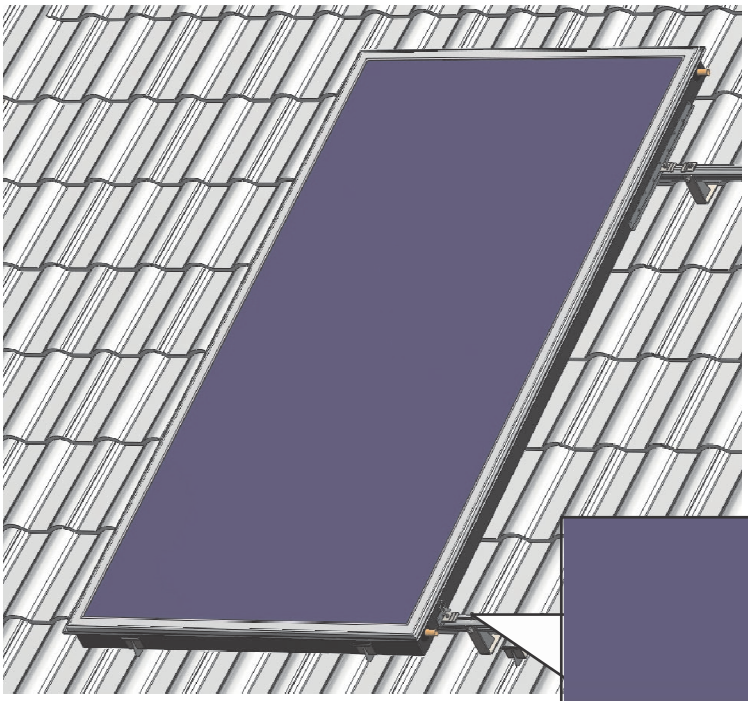
Important.

Protect Collector against potential damage (slide and fall accidents) that could occur when transporting solar Collectors on the roof.



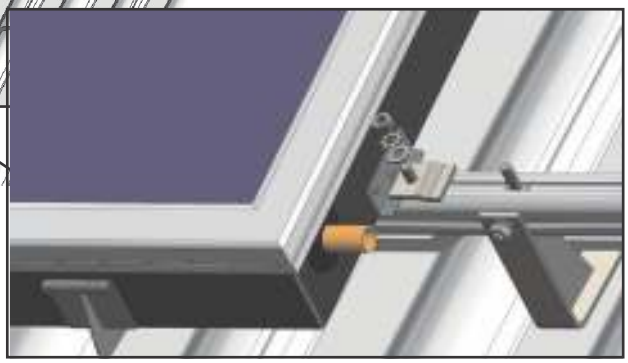
Position the bottom edge of Collector against the Profile Rail (1). Slide the Collector carefully onto the two Graspers (4) then lean the Collector on the top Profile Rail (1).





Place the Collector symmetrically towards Graspers (4) then fix the four Clamps (3).

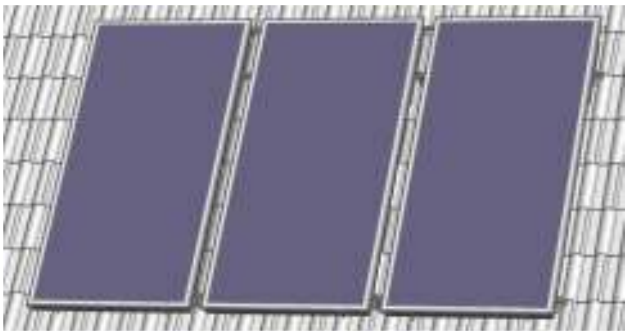
Fixing the Clamps: Put the Clamp (3) onto locking screw (the screw (6) that was placed into the Profile Rails (1) earlier - see sub-clause 4.4), then bring two elements as close as possible to Collector and put the Clamp (3) onto Collector angle bar. Next, put a washer, serrated lock washer into position and lock the nut lightly.



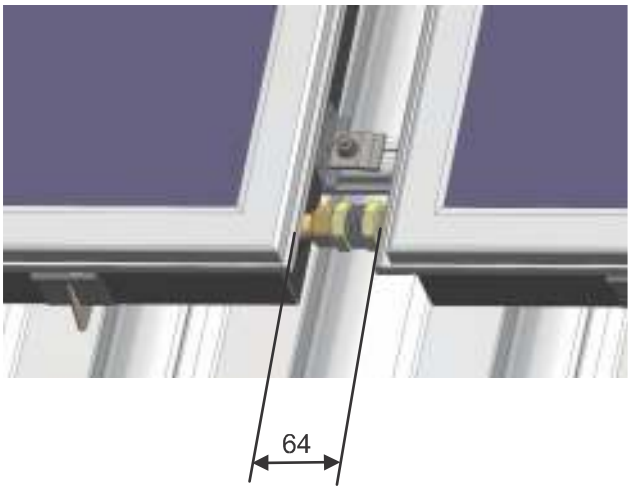
Adjust the final position of Collector.

4.7. Assembly of additional Collectors

Additional Collectors included in the set (excluding one piece Collector set) must be fixed on the Profile Rail (1), follow the installation work sequence described in sub-clause 4.6 and make a hydraulic connection of Collectors at the same time (according to sub-clause 4.8).



Keep the distance between the Collectors relatively constant (approx. 64 mm).



4.8. Hydraulic connection

1 - Collector connector
2 - Nut
3 - Clamping ring
4 - Expansion joint

Important

Maximum number of Collectors in one row is 5 pieces.

The correct Collector connection sequence is:
- undo the nut (2) then put the nut onto connector (1),
- put the Clamping ring (3) onto connector,
- lock the nut (2) into expansion joint (4),
- put the nut onto connector of second Collector,
- put Clamping ring onto connector of second Collector,
- bring second Collector near to expansion joint,
- lock the nut onto expansion joint.

Important.

Tighten the lock nut tight enough to ensure a seal that is sufficient to guard against leaks. Do not tighten the nut with too much force to avoid damages of connector and expansion joint.

4.9. Inspection after assembly

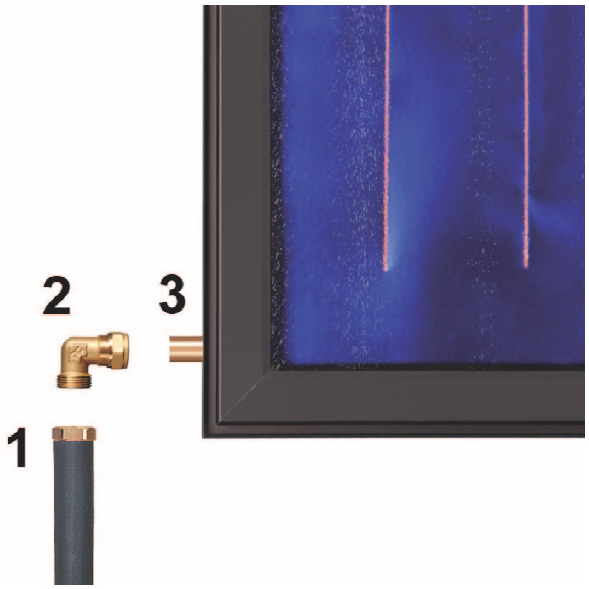
After the hydraulic connection has been completed, double check that all connections are tight and secure. Make sure all Collectors are firmly fixed to the mounting structures.

4.10. Inlet connection

Important.

Hydraulic connection elements can be fitted to either the right or the left side of Collectors.

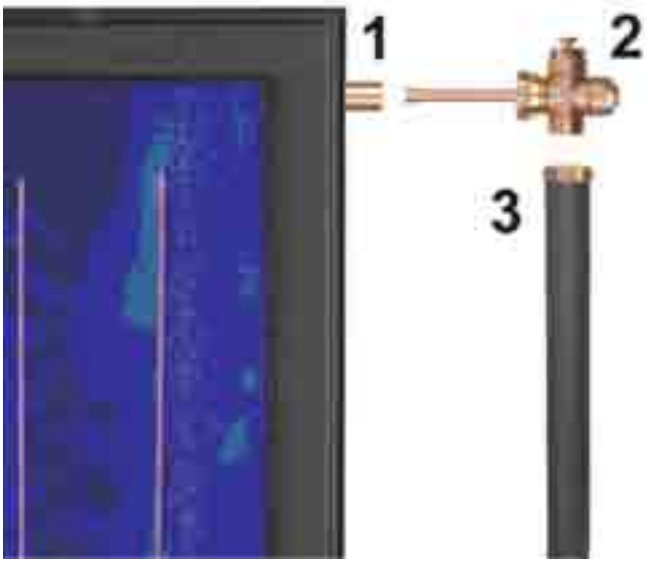
1 -Fflexible insulated hose 3/4''
2 - Clamping elbow
3 - Collector connector



The correct inlet connection sequence is:
- put the elbow nut (2) onto Collector connector (3),
- put the Clamping ring onto Collector connector,
- lock the nut onto elbow,
- lock the flexible hose nut (1) onto elbow
- connect flexible hose to solar installation system

4.11. Outlet connection

1 - Collector connector
2 - cross pipe with manual air vent and immersion sleeve
3 - flexible insulated hose 3/4"



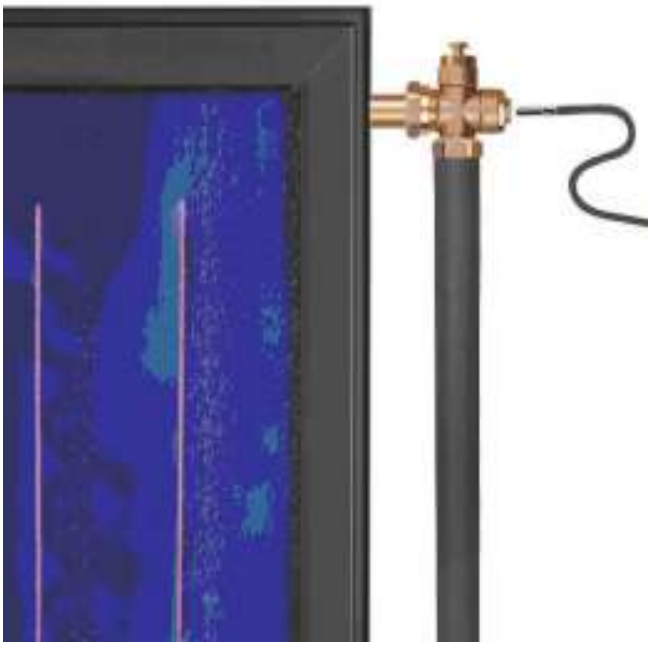
The correct outlet connection sequence is:
- use the Clamping piece to connect cross pipe (2) to Collector connector (1),
- lock flexible hose (3) onto cross pipe (2),
- connect flexible hose to solar installation system.

Standard Solar Mounting Kit includes manual air vent, however you can install an automatic vent instead. For the automatic air vent install ball valve (between cross pipe and air vent).

Important.

As solar systems reach high temperatures, installation of the vents and valves must be made of metal only.

4.12. Temperature sensor



Solar system malfunctions

Most solar system malfunctions are caused by faulty temperature sensor installation or damage to the signal cable.

To prevent damage to the signal cable by birds or rodents ensure the signal cable is encased by a corrugated pipe.

Install temperature sensor into immersion sleeve.
- insert temperature sensor all the way down into immersion heater,
- prevent Clamping spring from sliding out

4.13. Collecting pipes

Use flexible insulated hoses to make hydraulic connection to collecting pipes. Connection of flexible hoses with solar installation must be made below vent valve level.

Do not connect inflexible collecting tubes directly to Collector.

Important.

Run the solar tubes through the roof by universal pass through for roofing or air shaft.

Important.

Run the temperature sensor wire along with return flexible hose.

Consideration must be given to the diameter of solar tubes. The proper diameter of tubes is determined by flow rate of heating medium: 0, 4 ÷ 0, 7[m/s1.

The table below shows the diameter of tubes (recommended) according to quantity and type of solar Collectors.

ES Collector

Number of Collectors	Collector Arrays	Diameter of collecting tube [mm]
1	1	12 x 1
2		15 x 1
3		18 x 1
4		
5		
6	2	22 x 1
8		
10		

5. Final Commissioning

5.1 Check -Up

Once the installation has been completed the system must be flushed, hydraulic tested and system filled with Solar Fluid. In order to carry out these tasks a solar pump and expansion vessel need to be installed. Please refer to the manufactures installation & operating instructions for operation of these items.

The following steps require to be completed:
- make sure all elements of solar installation are fixed correctly,
- flush the pipe system,
- perform hydraulic pressure testing,
- fill the system with solar fluid.

5.2 Venting

Use charging-de-aerating station for filling and flushing solar installations. When the automatic air vent opens you must turn off the 'shut-off valve' once the venting has been completed. This 'shut-off' valve is located before the vent.

5.3 System protection

Once the above system testing has been carried out the Thermal Solar Collectors **must** be protected from the heat of the sun & potential damage from birds and rodents. A waterproof & heat resistant insulated cover must be fitted over the complete Thermal Solar installation (i.e. including all electrical sensors & control cables) .

6. Maintenance and Service

- Maintenance personnel should, before starting work, conduct risk assessments and take suitable precautions in order to prevent slips, trips and fall accidents.
- When moving the Collector to carry out maintenance work, ensure these are secured prevent falling.
- Use suitable tools and equipment.
- Use personal protective equipment (e.g. protective gloves, overalls boots, etc.)
- Check Collector temperature before executing any maintenance work; do not attempt maintenance while Collector is hot.
- Solar system inspection must be carried out according to warranty guide of any supplied components.
- Annual routine maintenance checks are recommended to assure trouble free solar system operation.

Frost Protection: Determine the frost resistance of solar fluid using the refractometer. Refill and vent the solar circuit, if the frost resistance of liquid drops below —20°C

System Pressure: Control the working pressure of solar circuit (drop pressure should not occur).

Expansion Vessel: control the initial pressure of expansion vessel. Disconnect the expansion vessel from the system and determine the rate of pressure. The initial pressure should be 0, 3 bar lower than filling pressure (i.e. Normally 2, 5 to 3 bar).

Cleaning the Collectors: When necessary clean the Collector using a general cleaning solution (i.e. mix the washing soda or soap liquid with water) then apply and rinse with water.

Control and safety system: Check the control and safety system as well as support structure of Collectors.

It is recommended that maintenance is carried out by a MCS Certified Installer to assure continued reliable performance of the system

7 Guarantee

The EHC Thermal Solar System is guaranteed against faulty materials or manufacture provided that:

- It has been correctly installed as per this document and all the relevant standards, regulations and codes of practice in force at the time.
- It has not been modified in any way, other than by the manufacturer.
- It has not been misused, tampered with or subjected to neglect.
- It has only been used for its intended purpose
- It has not been subjected to frost damage
- The unit has been serviced annually
- The guarantee period starts from the date of purchase and no registration is required.
- The extended guarantee is not transferable, and rests with the original householder.
- The system is fed from a public water supply.

The following Guarantee periods apply from date of purchase

Solar Collectors & Mountings	10 years
Electrical componnts & equipment	2 years

Please note that invoices for servicing may be requested to prove that the unit has been serviced annually by a competant MCS certified installer/service person.

EXCLUSIONS – THE GUARANTEE DOES NOT COVER the effects of scale build up, any labour charges associated with replacing the unit or its parts, nor any consequential losses caused by the failure or malfunction of the unit.

For advice, support, or further information on EHC's full range of heating products, call now on **01698 820 533.**

The EHC Ltd, Unit 40, Block 5, Third Road, Blantyre Industrial Estate, Blantyre, Glasgow, G72 0UP

Tel. 01698 820533
Fax. 01698 825697

info@electric-heatingcompany.co.uk
www.electric-heatingcompany.co.uk